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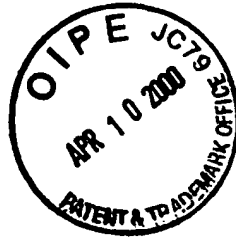
Docket No. 7741.00

Application of

Ramin C. Nakisa

Serial No. 09/495,759

Filed: February 1, 2000



**CLAIM FOR BENEFIT OF  
EARLIER-FILED FOREIGN  
APPLICATION**

APR 06 2000

Group Art Unit: 2761

Examiner: Unknown

**FOR: METHOD AND APPARATUS FOR ADVERTISING  
OVER A COMMUNICATIONS NETWORK**

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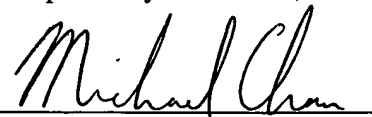
Assistant Commissioner for Patents

Washington, D.C. 20231

Sir:

Applicants wish to claim the benefit of the filing date of the earlier U.K. Application Serial No. 9902480.4, filed on February 5, 1999, recited in the Declaration under the provision of 35 U.S.C. 119, and accordingly, Applicants submit herewith a certified copy of said British application.

Respectfully submitted,



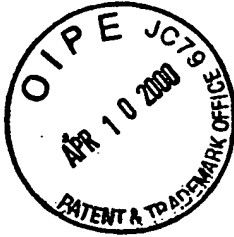
Michael Chan  
Reg. No. 33,663  
Attorney for Applicant(s)

NCR Corporation, Law Department, ECD-2  
101 West Schantz Avenue, Dayton, OH 45479-0001  
Tel. No. 937-445-4956/Fax No. 937-445-3733

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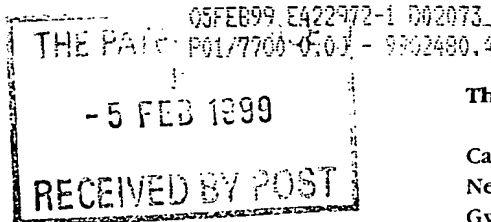
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1. Your reference

7741

2. Patent application number

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3. Full name, address and postcode of the or of each applicant (underline all surnames)

NCR INTERNATIONAL, INC.  
1700 SOUTH PATTERSON BOULEVARD  
DAYTON, OHIO 45479  
UNITED STATES OF AMERICA

Patents ADP number (if you know it)

7409362001

If the applicant is a corporate body, give the country/state of its incorporation

INCORPORATED IN THE STATE OF DELAWARE

4. Title of the invention

METHOD AND APPARATUS FOR ADVERTISING  
OVER A COMMUNICATIONS NETWORK

5. Name of your agent (if you have one)

R G ROBINSON

"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)

INTERNATIONAL IP DEPARTMENT  
NCR LIMITED  
206 MARYLEBONE ROAD  
LONDON NW1 6LY

Patents ADP number (if you know it)

1982001

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and (if you know it) the or each application number

Country

Priority application number  
(if you know it)

Date of filing  
(day / month / year)

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application

Date of filing  
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8. Is a statement of inventorship and of right to grant of a patent required in support of this request? (Answer 'Yes' if:

- a) any applicant named in part 3 is not an inventor, or
  - b) there is an inventor who is not named as an applicant, or
  - c) any named applicant is a corporate body.
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Statement of inventorship and right to grant of a patent (*Patents Form 7/77*)

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Request for substantive examination (*Patents Form 10/77*)

Any other documents  
(please specify)

11. I/We request the grant of a patent on the basis of this application.

Signature

*Julie Ellis*

Date

3/2/99

JULIE ELLIS

TEL: 0171-725 8379

12. Name and daytime telephone number of person to contact in the United Kingdom

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Method and Apparatus for Advertising Over a Communications Network.

The present invention relates to advertising over a  
5 communications network comprising a plurality of interactive client subscriber sites interconnected with an advertising information server site.

It has already been proposed in our co-pending European  
10 patent application No (98306734.9) to provide a computer network such as the Internet to provide advertisements for products and services. The Internet commonly uses a client-server based information service presentation system known as the "World Wide Web" (WWW) also referred to as The Web.  
15 In The Web, a server station or "site" may provide a series of screens or "pages" of information which a client or customer can access in sequence by sending appropriate request signals over the Internet. The Web has a standard protocol for information transfers known as the HyperText  
20 Transfer Protocol (HTTP) and request signals from a client and data signals from a server are in a format known as HyperText Mark-up Language (HTML).

In our above-mentioned co-pending patent application it has  
25 been proposed to present advertising information in the form of an interactive display of a role model or virtual idol portrayed in a role as a consumer of goods and services. The role model or virtual idol has affinity characteristics chosen to build up a character profile that combines the  
30 most predominant consumer affinity characteristics of a target subscriber group. In addition to a central character profile, further connected character profiles and an environment profile are built up. The aim of building up

the character and environment profiles in this way is to ensure that the central character and environment match closely the lifestyle aspirations of the target consumer segment.

5

Whilst the invention described in our previous co-pending patent application is an effective way of presenting advertising information, the primary benefit of using a role model or virtual idol is that it creates an affinity with a particular consumer segment. However, there is still a need to optimise the affinity of characters to the consumers to which the advertising information is directed.

10

It is an aim of the present invention to improve the affinity between characters and consumers having access to advertising displays incorporating the characters.

15

According to the present invention, there is now provided a method of advertising over a communications network comprising a plurality of interactive customer subscriber sites interconnected with an advertising information server site, the method being characterised by the steps of;

20

storing the attributes of a plurality of customers in the form of customer attribute vectors  $c_k$ ,

25

storing the attributes of one or more role models in the form of one or more role model attribute vectors  $i_j$ ,

defining a marketing function  $M$  which maps the customer attribute vectors to the one or more role model attribute

vectors such that

30

$$i_j = M(c_k) ,$$

providing, at the interface advertising information server site, interactive advertising displays incorporating the one or more role models,



establishing an interactive communication link from the customer subscriber sites to the advertising information server site enabling customers to access the displays and to make purchases in response to the displays, and

5 updating the marketing function M in dependence upon the customer purchases.

According to the present invention, there is also provided apparatus for advertising over a communications network  
10 comprising a plurality of interactive customer subscriber sites interconnected with an advertising information server site, the apparatus being characterised by;

means for storing the attributes of a plurality of customers in the form of customer attribute vectors  $c_k$ ,

15 means for storing the attributes of one or more role models in the form of one or more role model attribute vectors  $i_j$ ,

means for defining a marketing function M which maps the customer attribute vectors to the one or more role model  
20 attribute vectors such that

$$i_j = M(c_k) ,$$

means providing, at the interface advertising information server site, interactive advertising displays incorporating the one or more role models,

25 means for establishing an interactive communication link from the customer subscriber sites to the advertising information server site enabling customers to access the displays and to make purchases in response to the displays, and

30 means for updating the marketing function M in dependence upon the customer purchases.

The invention will now be further described, by way of example, with reference to the accompanying drawings in which;

5 Figure 1 is a block diagram representing an open communication network embodying the present invention,

Figure 2 is a flow diagram representing the generation of a target advertising information web site,

10

Figures 3A and 3B are examples of computer generated characters,

Figure 4 is an example of a page from the target advertising information web site as accessed by a remote client subscriber,

15

Figure 5 illustrates the generation of virtual idols having attributes mapped to the attributes of client subscribers,

20

Figure 6 illustrates the use of a neural net to evolve a mapping function in a step of the process of Figure 5,

Figure 7 illustrates a subset of data relating attributes of virtual idols to the attributes of client subscribers, and

25

Figure 8 illustrates the use of a genetic algorithm to evolve a mapping function in a step of the process of Figure 5.

30

Referring to Figure 1, the communications network 10 includes a plurality of remote client subscriber sites 20, the Internet WWW communication network and a plurality of WWW information sever sites 30. The plurality of client and

information server sites include a plurality of target client subscriber sites 22a, 22b, 22c . . . . and target information server sites 32a, 32b, 32c . . . . . These target information server sites 32a, 32b, 32c . . . . . are Web sites of specific commercial enterprises, the pages of which advertise and provide information about consumer products or services. These sites 32a, 32b, 32c . . . . may also be equipped so as to allow clients which access these pages to conduct transactions; i.e. to order particular products or services and to pay for them over the Web. The target client subscriber sites 22a, 22b, 22c . . . . represent the principal consumer segment for the consumer products or services of the target information server sites 32a, 32b, 32c . . . . . In other words, the target client subscriber sites 22a, 22b, 22c . . . . are the consumers or customers to which the commercial enterprises at the target information server sites 32a, 32b, 32c . . . . . wish to market and sell their products and services. The communications network 10 also includes an interface advertising server site 40, the function of which is to attract the target subscribers and to facilitate communication between the target client subscriber sites 22a, 22b, 22c. . . . . and the target information server sites 32a, 32b, 32c. . . . .

The generation of an interface advertising server site 40 will now be described with reference to the flow diagram in Figure 2. In Step 50, a target subscriber group is identified. The target subscriber group is a number of consumers having one or more specific common consumer affinity characteristics or attributes. For example, a subscriber group may include a number of people having a certain lifestyle, such as people who buy a certain product (e.g. a brand of clothing or footwear, compact discs of a particular artist or type of music), people who own a car of

a particular brand, people who travel abroad to certain destinations or who have certain interests etc.

alternatively, a subscriber group may be a number of people who are interested in or who idolize a certain high profile  
5 personality or group of personalities such as a popstar band, a sportsperson or a team, actors, models etc. Such a target subscriber group is identified using known market analysis techniques.

10 In Step 52, the consumer affinity characteristics or attributes of the identified target subscriber group are determined. Consumer affinity characteristics or attributes may be defined as the interests, values and lifestyle aspirations of the consumer segment. For example, on  
15 analysis of a target subscriber group which buys a certain brand of footwear, it may be found that the majority of the segment are male, belong to a certain age group, enjoy watching football, eat certain types of food products, listen to certain types of music, watch certain TV  
20 programmes or films, socialize in certain environments, idolize certain high-profile personalities, have certain moral and political opinions etc. Analysis of the target subscriber group is carried out using known socio-economic and psychosocial models in order to determine a broad  
25 spectrum of consumer affinity characteristics or attributes.

On determination of the consumer affinity characteristics of the identified target subscriber group, a virtual idol character profile is built up based on these consumer  
30 affinity characteristics or attributes in Step 54. This character profile combines the most predominant consumer affinity characteristics or attributes of the target subscriber group into a single central character or group of characters (idols). For example, the central character

profile built up from the consumer affinity characteristics or attributes of the target subscriber group that bought a certain brand of footwear may include the following information:

5

Sex : Male;

Age : 20 Years old;

Status : Single;

Employment : Full time Sales Assistant

10 Salary : \$2000 per month

Home : One bedroom apartment

Status : Cohabiting with Girlfriend

Family : Divorced parents

Two Sisters

15 Relationships : Two close male friends

Lifestyle : Smoker(cigarette brand, number per day).

Alcohol (brands, no of units)

Music (favourite artists, groups)

Food (eating habits, favourite foods)

20 Fashion (dress code, fashion brands)

Social life (clubs, bars, restaurants)

In addition to the central character profile, further connected character profiles and an environment profile are built up in Step 56. The connected character profiles represent other characters who are based around the life of the central character in some way (e.g. partner, friend, colleagues, family etc) and are also determined from the consumer affinity characteristics of the target group. The environmental profile represents the environment in which the central and connected characters exist (e.g. homes, workplaces, shops, restaurants, bars, clubs etc) and is also

determined from the consumer affinity characteristics or attributes of the target consumer group.

It should be understood that the aim of building up  
5 character and environment profiles in this way is to ensure  
that the central character and environments match closely  
with the lifestyle aspirations of the target consumer  
segment (goes to particular clubs, wears certain fashion  
10 brands, has particular interests and attitudes). The life of  
the central character should match the issues perceived by  
the target consumer segment as being of real relevance to  
them (e.g. relationship problems, employment issues,  
financial problems, etc).

15 In Step 58, virtual characters are created based on the  
central character profile and the character profiles of all  
the other characters in the life of the central character  
Known anthropomorphic frames and character animation  
applications (e.g. 3D-Studio Max) are used to create these  
20 virtual characters. Skin and texture mapping is also  
achieved using known techniques (e.g. Adobe Photoshop and  
Avatar Maker). Examples of computer generated central  
characters or "virtual idols" are shown in Figures 3A and  
3B. The virtual characters created are either photo-  
25 realistic renderings of a fictitious or actual person or  
high quality caricatures or a combination of both. A variety  
of software applications are available in the marketplace  
which may be used to achieve the same or similar effects.

30 In Step 60 all the virtual characters and their environment  
are imported into a Hyper-text Markup Language (HTML) and  
Virtual Reality Markup Language (VRML) based Website (VRML  
is a standard signal format for virtual reality  
applications) which constitutes the interface advertising

server site 40. Since all characters and environments are rendered in VRML, interaction of the characters with each other and with different environments is possible. The interface server site 40 also includes HTML frames

5 (preformatted windows) so that different scenes of the central character interacting with other characters or with different environments can be depicted. For example, the central character can be animated to move around in any chosen environment (e.g. a clothes shop, a bookstore, a  
10 café, a bar etc.). An audio application is also included so that the characters may speak to each other or make statements. Various known Internet audio streaming applications can be used.

15 The communications network 10 is designed to run any standard Internet browser (e.g. Netscape Navigator/communicator or Microsoft Explorer). An electronic mail facility is also provided so that client subscribers can communicate with the virtual characters at the interface  
20 Web site 40. Client subscribers may also speak to the characters themselves.

The Internet uses Uniform Resource Locators (URLs) for specifying objects on the Internet. A URL string denotes  
25 both the server site and the particular file or page on that server site. The use of URLs to access specified server sites and pages is well known and will not be described herein. All aspects of the central and other connected characters and the environment in which they live (e.g.  
30 clothes worn, shoes worn, places frequented, shops visited etc) are referenced by URL strings (HTML co-ordinates). This means that it is possible to select objects in the virtual world so as to connect to another Web site denoted by the URL string. This Web site constitutes a target information

server site 32a, 32b, 32c . . . , the pages of which  
advertise and carry information about the object selected  
and/or other similar related objects. The site 32a, 32b, 32c  
. . . may also be equipped with electronic transaction  
5 facilities where an order may be placed for a selected  
product or service and payment made over the Internet. Any  
suitable type of on-line purchasing systems may be used and  
may include known On-Line Analytical Process (OLAP)  
applications for stock accessibility and transaction  
10 processing using Secure Electronic Transactions.

The operation of the communications network 10 will now be  
described. A user at one of the remote target client  
subscriber sites 22a, 22b, 22c . . . . can access the  
15 interface advertising server site 40 through the Internet  
WWW communication network. It should be understood that such  
a user represents a member of the target subscriber group  
and that this user is likely to be attracted to the  
interface advertising server site 40 as the central  
20 character and environment are likely to appeal to the user.  
This may be thought of as analogous to a soap opera on  
television in that the members of the public are attracted  
to, relate to or develop an affinity for fictitious soap  
characters and their environment and lifestyles. The central  
25 character of the interface advertising server site 40 in  
effect represents a "virtual idol" or a role model.

The user of the target client site 22a, 22b, 22c . . . .  
accesses the interface advertising server site 40 in the  
30 normal way by selecting the appropriate Uniform Resource  
Locator URL) which denotes both the interface advertising  
server site 40 and the particular file or page on that  
server. On accessing the pages of the interface advertising  
server 40, the user "enters" the virtual world of the



central character ("virtual idol" or role model) in a similar manner to viewing a soap opera on television. In this virtual world, the central character interacts with the connected characters and the virtual environment. Each character may be thought of as having a personality and acts out a particular role. The central character (virtual idol) plays the leading role and "acts out" a certain "life", while the connected characters have roles in the life of the central character. Each connected character has its own "life" which is related to that of the central character in some way. The "life" of the central character and those of the connected characters is different each day and develops over time in a similar manner to the lives of real people or fictitious soap opera characters.

The interface advertising server site 40 comprises an interactive display of the virtual idol portraying the affinity characteristics or attributes in a role as a consumer of goods and services. A user may communicate with the central character (virtual idol or role model) or other characters by sending them electronic mail in a similar manner to sending fan mail to a soap opera character or a real-life idol. In contrast to viewing a soap opera however, a user may interact with the central or other characters and their environment. For example, as is shown in Figure 4, if the central character (the "idol") puts on a compact disc to listen to music, a user may select to listen to the compact disc by clicking on the virtual CD player displayed on the display screen at the client site using a mouse device and a sample of the music being listened to by the central character can be heard.

If the user really likes the music and wishes to purchase that compact disc, they may click the compact disc. By

clicking on the compact disc, the Web pages described by the URL string associated with the compact disc are accessed by the interface server and the user becomes connected to the target information Web site 32a, 32b, 32c. . . . which  
5 advertises and provides information about the compact disc and about the artist or group which have made the recording. The user can place an order and pay for the compact disc over the Internet in the known way.

10 Similarly, by selecting the shoes of the central or other connected characters, connection is made to a target information Web site 32a, 2b, 32c. . . . , advertising and providing details of the shoes and other footwear and offering the possibility to purchase such products over the  
15 Internet. Restaurants, clubs, bars, theatres, museums and other establishments may also be marketed in the same way. For example, if the central character visits an art gallery one day, the gallery environment or a particular piece of art may be selected by a user. Connection is then made to  
20 the appropriate target Web site 32a, 32b, 32c. . . . where further information or publicity is available. Tickets may be purchased or reservations made at this Web site 32a, 32b, 32c.. . . .

25 In this way an interactive communication link is established between the interface advertising 40 and the client subscriber sites 22a, 22b, 22c. . . . . which provides interactive access from the client subscriber sites 22a, 22b, 22c. . . . . to the consumer goods and services  
30 portrayed in the interactive display.

An effective way is provided of interfacing consumers with information over the Internet about products and services which are likely to be relevant to their lives. At the same

time, an effective way is provided for commercial enterprises offering consumer products and services to reach specific target consumer segments and to develop commercial relationships by capturing the attention and affinity of that specific consumer segment to an appropriate "virtual idol" or role model on the Internet. The lifestyle and character of the "virtual idol" are defined by the commercial and lifestyle interests of the target consumer segment. Since the life of the "virtual idol" changes from day to day and develops, the attention and affinity of the target consumer group is maintained.

Moreover, it allows life-style related products and services to be marketed and purchased over the Internet through use or interaction of the "virtual idol" with such products or services (e.g. the idol character that the consumer segment are attracted to wears specific brands of clothes, goes to this or that restaurant, buys x, y, z CDs).

It should be understood that the central character ("virtual idol" or role model) may be a group of characters of equal importance in the virtual world (e.g. a sports team, popgroup or group of friends) rather than a single character.

The pages carrying information related to the products and services which may be selected by a user (i.e. the lifestyle related products or services of the central character) may be present at the interface site itself. Hence, other Web sites do not have to be accessed in order to obtain information or to make purchases. Alternatively, a simple database of the products and services available may be downloaded on the interface site from which the appropriate information is retrieved when a user selects an object.

In Figure 5, a number of "virtual idols" or role models are represented in an attribute space 150 using a set of attributes e.g. the physical attributes of sex, size, shape, colour, voice quality, and accent and the character

5 attributes of lifestyle aspirations, tastes in music, films and television programs, interests, hobbies, likes and dislikes. The attributes are expressed as a set of numbers for each of the "virtual idols". Some attributes will be represented as real numbers, such as size and age, while  
10 other attributes such as sex or musical preferences will be represented as integer values. The attributes of an idol are represented as a vector  $\underline{i}$  containing its collected attributes. Thus in Figure 5, the attribute space 150 contains the vectors  $i_1, i_2, i_3 \dots$  of corresponding idols.

15 The attributes of a consumer, like those of an idol, can be defined as a vector  $c$  containing the collected attributes of the consumer. Thus in Figure 5, the attribute space 151 contains the vectors  $c_1, c_2, c_3 \dots$  of corresponding consumers in the target consumer segment.

20

The virtual idol that is presented to a target consumer segment in the manner already described with reference to Figures 1 to 4, should be made as appealing to the target consumer segment as possible. The appeal of a "virtual idol" or role model is determined by the propensity of consumers  
25 in the target consumer segment to make purchases in response to that "virtual idol" or role model. The propensity to make purchases is defined in the present invention by a marketing function  $M$  which maps the attributes of a consumer  $c$  to the attributes of an idol  $i$ . The marketing function  $M$  is defined  
30 by equation (1) below;

$$i = M(c)$$

Equation 1

The best functional form of the marketing function  $M$  would depend on the application, but in most cases it would be

non-linear. Once a functional form has been decided upon, the parameters of  $M$  must be determined empirically.

In Figure 5, in step 152, a number of idols are generated and the attributes of each are represented by a corresponding vector  $i_j$ . In step 153, the idols are each displayed to respective consumer segments having attribute vectors  $c_k$ . The attributes of the different consumer segments are known from previously collected data and are represented as consumer vectors in the attribute space 151 as already explained. The sales results from the sets of idol and consumer attributes are stored in step 154. The sales results are processed in step 155 using standard statistical or artificial intelligence techniques in order to learn the best mapping from the vectors  $c_k$  to the vectors  $i_j$ .

In step 156, the optimal idols  $i_j$  indicated by the best mapping learned from the step 155 are generated and used in the advertising display to any new customer within the consumer segment having the attributes  $c_k$ . The iteration of steps 153 to 156 causes the best mapping function  $M$  to develop.

In Figure 7, the sales results referred to in step 154 of Figure 5 are illustrated as a matrix of relationships between the vectors  $i_j$  and the vectors  $c_k$ . A sale is represented by a 1 and the absence of a sale is represented by a 0.

A number of alternative techniques are available to implement the step 155 of Figure 5 and thereby estimate the optimal marketing function  $M$  that maximises sales. One such technique will now be described by reference to Figure 6. In

Figure 6, in step 160, the historical sub-set of data i and c that gave rise to successful sales is collected. In step 161, a three layer neural net is presented with the customer attributes c at the input layer as graphically represented at the bottom of Figure 6. In step 162, the network is presented with the attributes i that result in the greatest number of sales and in step 163 the neural net is modified using back propagation of errors to develop the desired ideal attributes i in the output layer of the neural net.

A second technique for implementing the step 155 of Figure 5 is to use a genetic algorithm to evolve the mapping function as will now be described with reference to Figure 8. In Figure 8, in step 180, a random 50 genomes are entered as an initial data set. Each genome individually models a mapping by means of chromosome data. It will be understood that the number of genomes entered in step 180 may be more or less than 50 and that the number 50 is illustrative only.

The fitness of each of the 50 genomes and consequently the mappings represented by the genomes is evaluated in step 181. The fitness of a mapping is judged by the sales success of that mapping. In step 182, 2 fitter parent genomes are selected based on the sales success of the parents. In step 183, the parents breed and produce offspring genomes which are evaluated in step 184. Those genomes in the data set that represent the worst mappings *M* are replaced in step 185. Further iterations of steps 182, 183, 184 and 185 selectively generate the best mappings.

Whilst two different alternative methods have been described to implement the step 155 of Figure 5, the invention is not limited to these two alternatives. An additional alternative within the contemplation of the invention is to treat the

marketing function parameters as probability distributions and use Bayesian inference to find the posterior distribution of the parameters based on the empirical evidence of the transaction data. Yet another alternative  
5 method within the contemplation of the invention is to use a non-linear (e.g. logistic) regression to map c to i.

The invention has been described in relation to mapping the attributes of customers or consumers c to the attributes of  
10 a number of different virtual idols i. The invention contemplates mapping the attributes of customers within a customer segment to a single virtual idol. Thus in the case of a single virtual idol, slightly different attributes of the idol may be presented to different consumers within the  
15 consumer segment. The most successful attributes of the virtual idol will come to predominate and the character and "lifestyle" of the virtual idol will evolve in a direction that enhances the sales success of the virtual idol. For example, the age, interests or voice quality and accent of  
20 the same individual idol may evolve in a direction that finds greater affinity to the target consumer segment within a particular geographic area.

It will also be apparent, to those skilled in the art, that  
25 the invention can be applied in the environment of an open communications network such as the Internet and in the environment of a network to which access is restricted to a particular consumer group such as the group of customers of a particular bank. The bank customers may have access to the  
30 communications network by way of self-service terminals provided by the bank or by other facilities provided by the bank each of which performs the function of an interactive customer subscriber site. The bank would have an advertising information server site to supply interactive advertising

information including a virtual idol or idols. The virtual idol or idols may be evolved to have regional characters according to the geographical locations in which the idol or idols are displayed. In the case where the bank customer has to enter a card or other personal identification, the virtual idol displayed to that customer can be selected from a library of virtual idols according to the attributes of the customer.

What has been described is a method and apparatus for advertising over a communications network comprising a plurality of interactive customer subscriber sites interconnected with an advertising information server site. The attributes of a plurality of customers are stored in the form of customer attribute vectors  $c$  and the attributes of one or more role models are stored in the form of one or more role model attribute vectors  $i$ . A marketing function  $M$  maps the customer attribute vectors to the or each role model attribute vector such that

$$i = M(c) ,$$

and the marketing function  $M$  is evolved in dependence upon customer purchases.



## Claims

1. A method of advertising over a communications network comprising a plurality of interactive customer subscriber  
5 sites interconnected with an advertising information server site, the method being characterised by the steps of;

storing the attributes of a plurality of customers in the form of customer attribute vectors  $c_k$ ,

10 storing the attributes of one or more role models in the form of one or more role model attribute vectors  $i_j$ ,

defining a marketing function  $M$  which maps the customer attribute vectors to the one or more role model attribute vectors such that

$$i_j = M(c_k) ,$$

15 providing, at the interface advertising information server site, interactive advertising displays incorporating the one or more role models,

establishing an interactive communication link from the customer subscriber sites to the advertising information  
20 server site enabling customers to access the displays and to make purchases in response to the displays, and

updating the marketing function  $M$  in dependence upon the customer purchases.

25 2. A method as claimed in claim 1, wherein the role model constitutes one of a plurality of such role models, the step of defining a marketing function  $M$  which maps the customer attribute vectors  $c_k$  to the role model attribute  
30 vectors  $i_j$  includes defining a plurality of marketing functions  $M$  which map customer attribute vectors  $c_k$  to a plurality of role model attribute vectors  $i_j$ , and the step of updating the marketing function  $M$  in dependence upon the customer purchases includes the step of learning

the mapping from the vectors  $c_k$  to the vectors  $i_j$  that maximise sales.

3. A method as claimed in claim 2, wherein the step of  
5 learning the mapping from the vectors  $c_k$  to the vectors  $i_j$  comprises using a genetic algorithm to evolve the mapping function.
4. A method as claimed in claim 2, wherein the step of  
10 learning the mapping from the vectors  $c_k$  to the vectors  $i_j$  comprises using a three-layer neural network to find the mapping function by back propagation.
5. A method as claimed in claim 2, wherein the step of  
15 learning the mapping from the vectors  $c_k$  to the vectors  $i_j$  comprises treating parameters of the marketing function as probability distributions and using Bayesian inference to find the posterior distribution of the marketing function parameters.
- 20 6. A method as claimed in claim 2, wherein the step of learning the mapping from the vectors  $c_k$  to the vectors  $i_j$  comprises using non-linear regression to map  $c_k$  to  $i_j$ .
- 25 7. Apparatus for advertising over a communications network comprising a plurality of interactive customer subscriber sites interconnected with an advertising information server site, the apparatus being characterised by;  
means for storing the attributes of a plurality of  
30 customers in the form of customer attribute vectors  $c_k$ ,  
means for storing the attributes of one or more role models in the form of one or more role model attribute vectors  $i_j$ ,

means for defining a marketing function  $M$  which maps the customer attribute vectors to the one or more role model attribute vectors such that

$$i_j = M(c_k) ,$$

5 means providing, at the interface advertising information server site, interactive advertising displays incorporating the one or more role models,

means for establishing an interactive communication link from the customer subscriber sites to the advertising information server site enabling customers to access the displays and to make purchases in response to the displays, and

means for updating the marketing function  $M$  in dependence upon the customer purchases.

15

8. Apparatus as claimed in claim 7, wherein the role model constitutes one of a plurality of such role models, the means for defining a marketing function  $M$  which maps the customer attribute vectors  $c_k$  to the role model attribute vectors  $i_j$  includes means defining a plurality of

20 marketing functions  $M$  which map customer attribute vectors  $c_k$  to a plurality of role model attribute vectors  $i_j$ , and the means for updating the marketing function  $M$  in dependence upon the customer purchases includes means

25 for learning the mapping from the vectors  $c_k$  to the vectors  $i_j$  that maximise sales.

9. Apparatus as claimed in claim 8, wherein the means for learning the mapping from the vectors  $c_k$  to the vectors  $i_j$  comprises means to process a genetic algorithm to evolve

30 the mapping function.

10. Apparatus as claimed in claim 8, wherein the means for learning the mapping from the vectors  $c_k$  to the vectors  $i_j$  comprises a three-layer neural network to find the mapping function by back propagation.

5

11. Apparatus as claimed in claim 8, wherein the means for learning the mapping from the vectors  $c_k$  to the vectors  $i_j$  comprises means to treat parameters of the marketing function as probability distributions and to employ  
10 Bayesian inference to find the posterior distribution of the marketing function parameters.

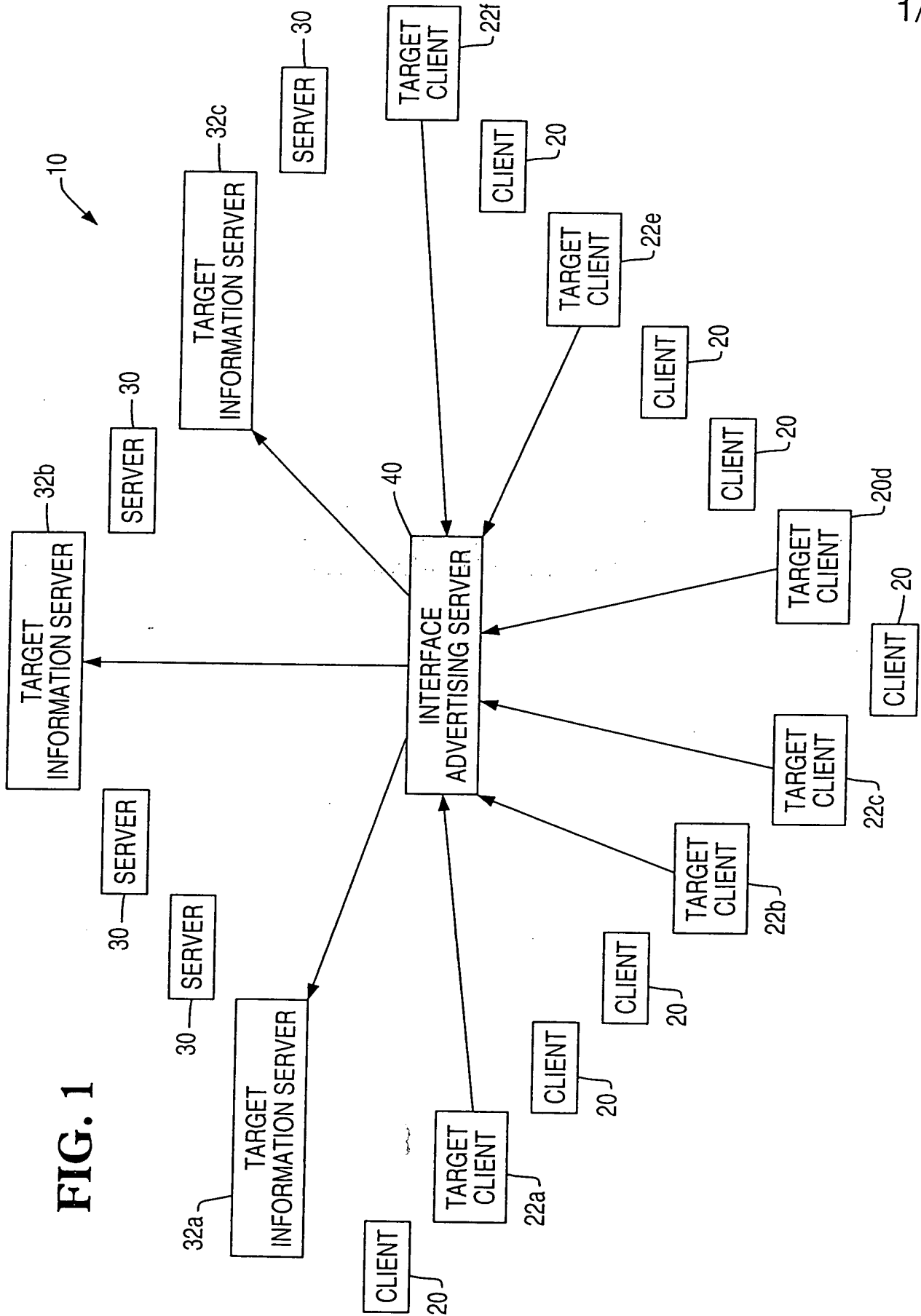
12. Apparatus as claimed in claim 8, wherein the means for learning the mapping from the vectors  $c_k$  to the vectors  $i_j$   
15 comprises non-linear regression means to map  $c_k$  to  $i_j$ .

20

## Abstract

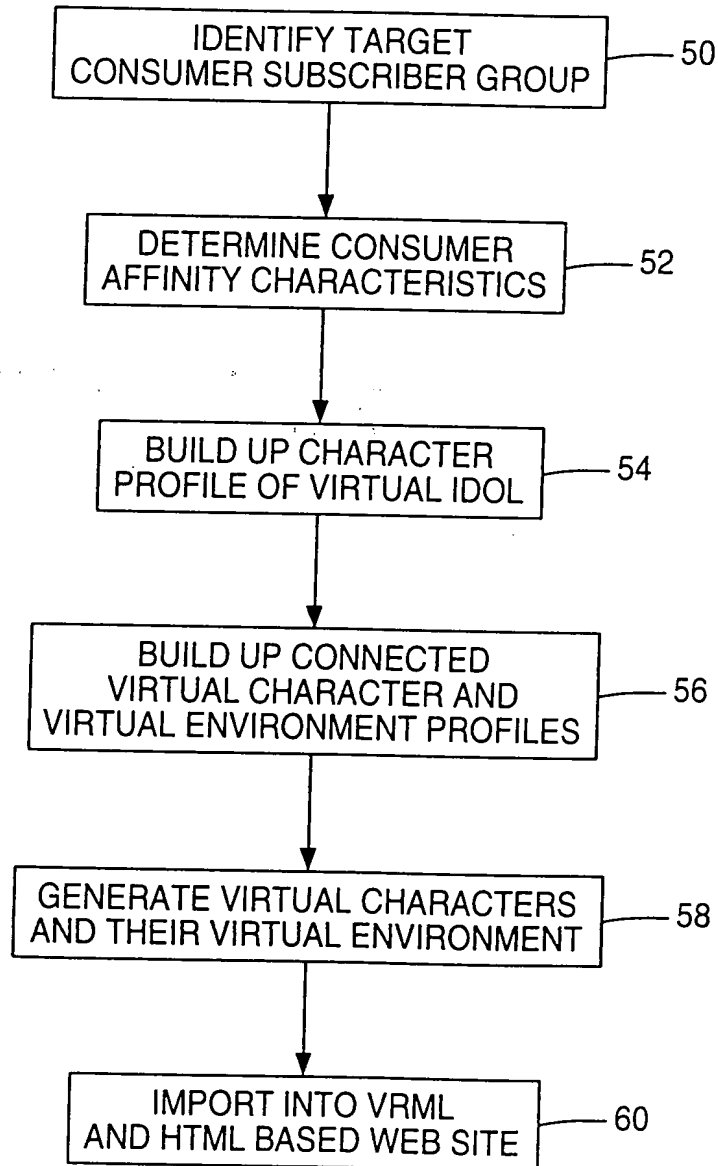
The present invention relates to advertising over a communications network comprising a plurality of interactive client subscriber sites interconnected with an advertising information server site. The attributes of a plurality of customers are stored in the form of customer attribute vectors  $c_k$ . The attributes of one or more role models are stored in the form of one or more role model attribute vectors  $i_j$ . A marketing function  $M$  is defined which maps the customer attribute vectors to the one or more role model attribute vectors such that  $i_j = M(c_k)$ . At the interface advertising information server site interactive advertising displays are provided incorporating the one or more role models. An interactive communication link is established from the customer subscriber sites to the advertising information server site enabling customers to access the displays and to make purchases in response to the displays. The marketing function  $M$  is updated in dependence upon the customer purchases.

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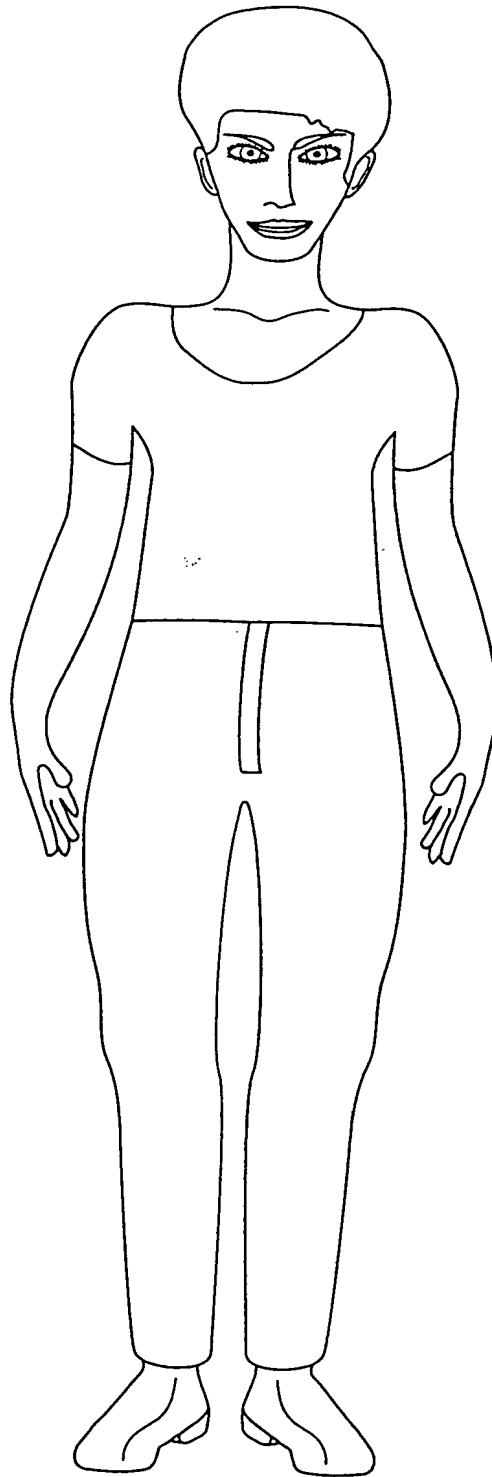
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**FIG. 2**

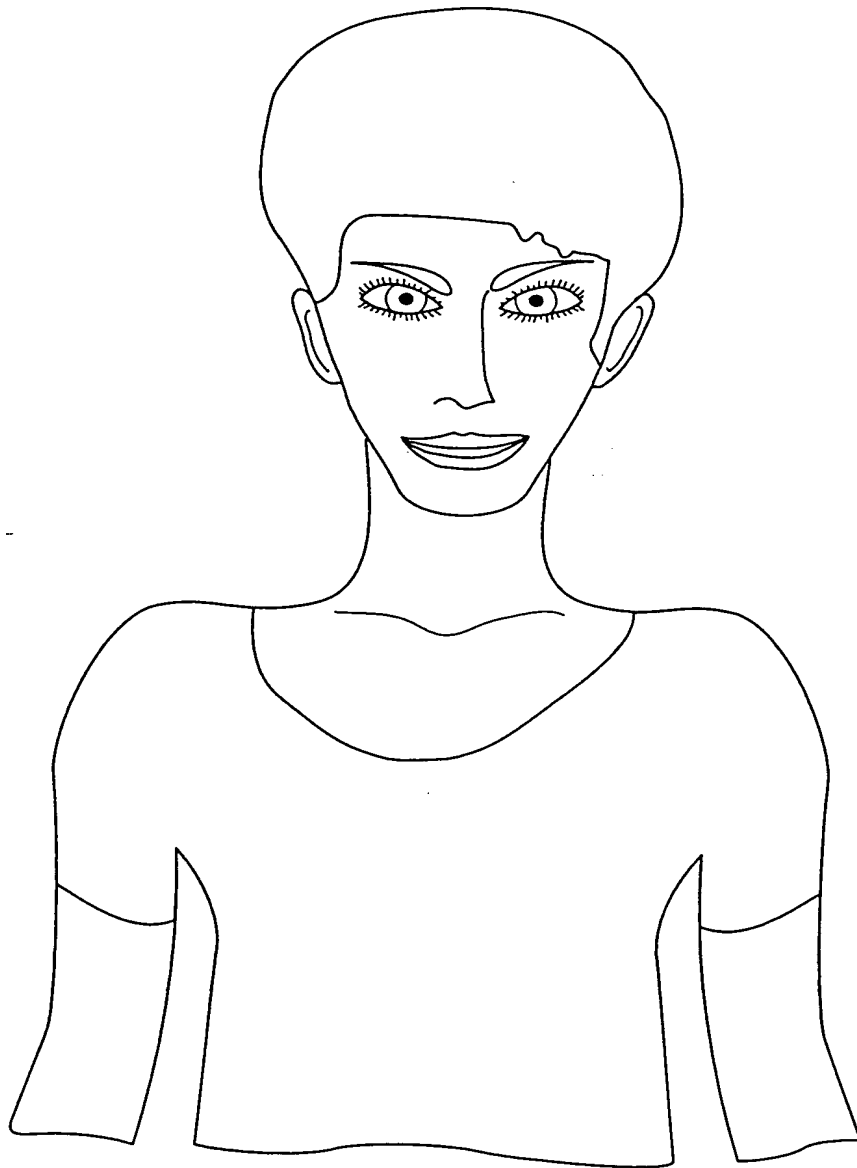
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**FIG. 3A**



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**FIG. 3B**



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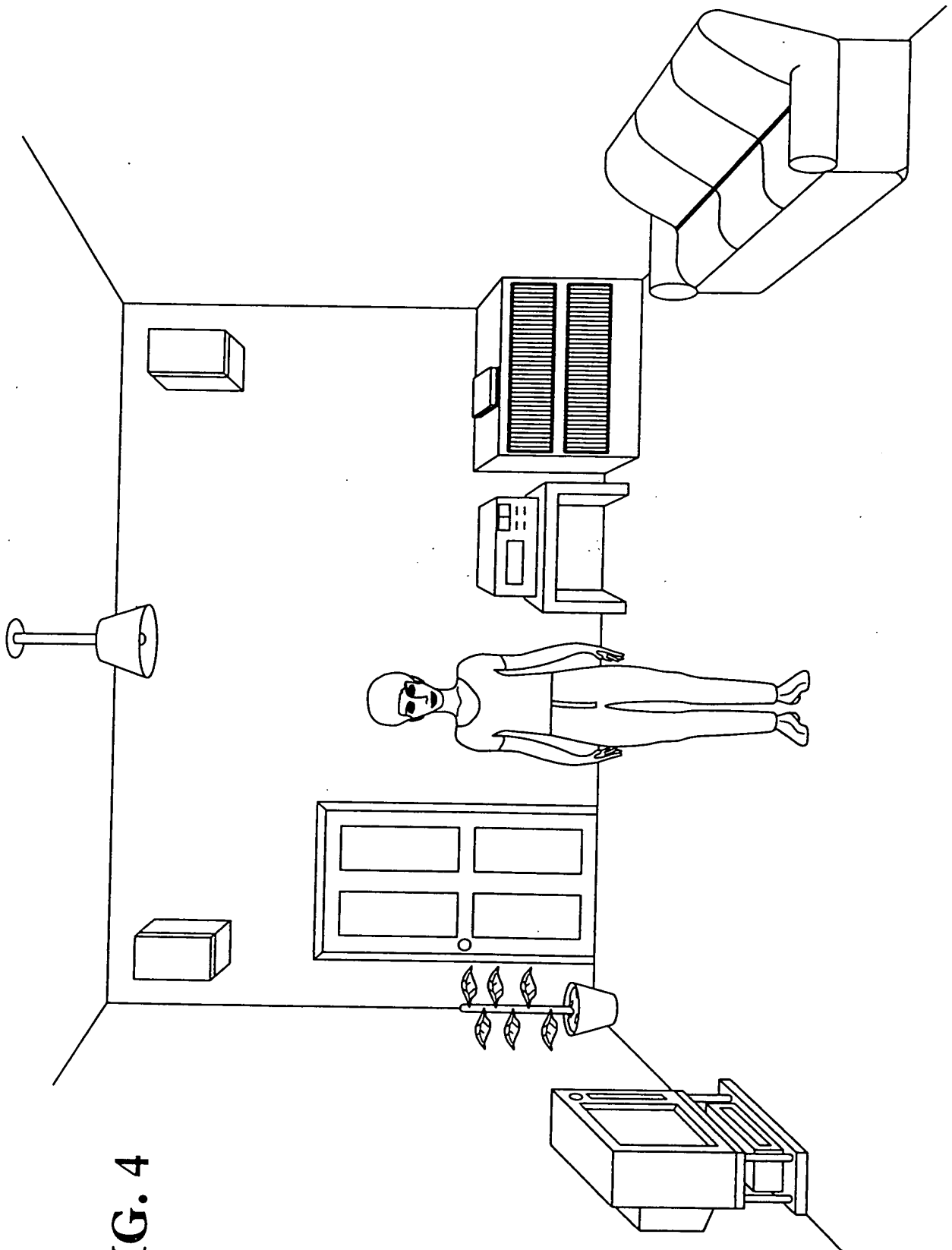
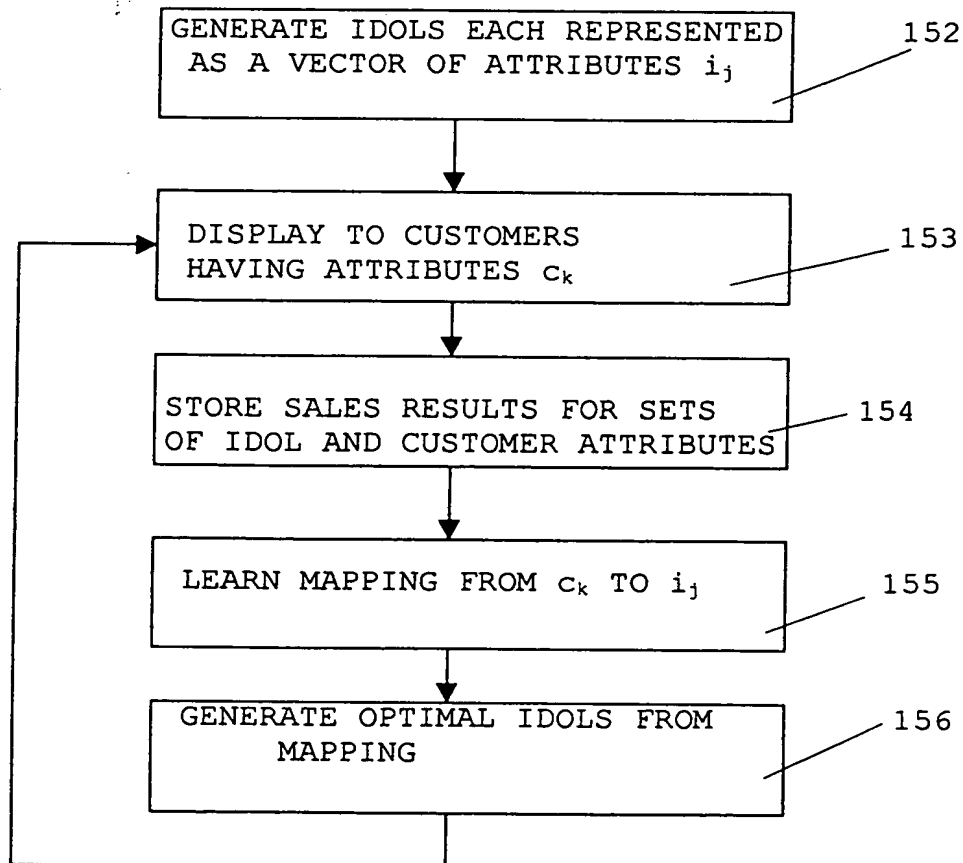
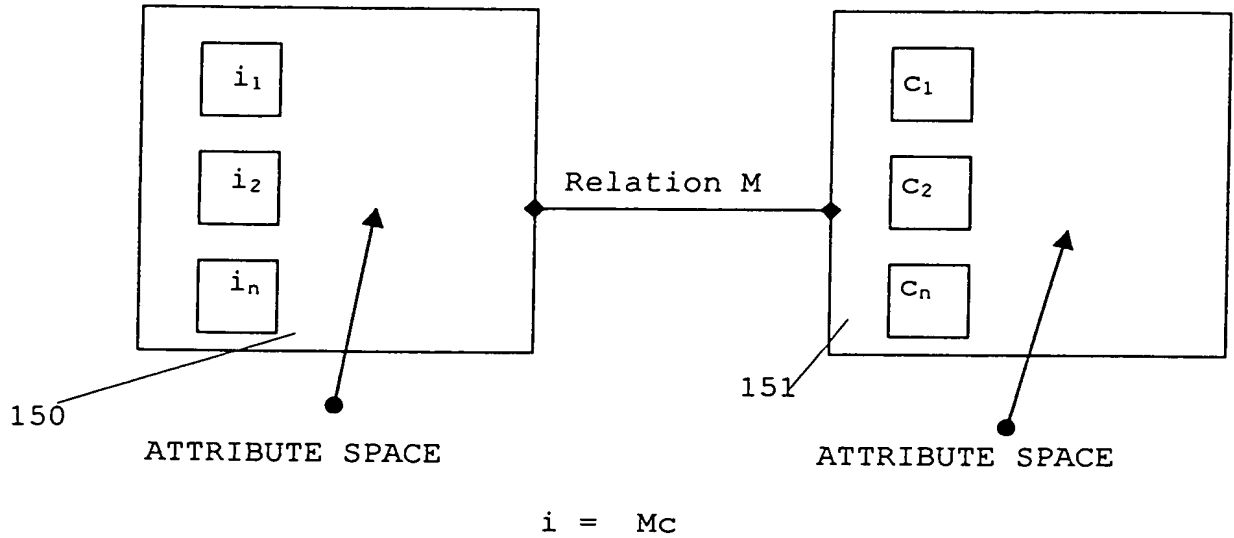


FIG. 4

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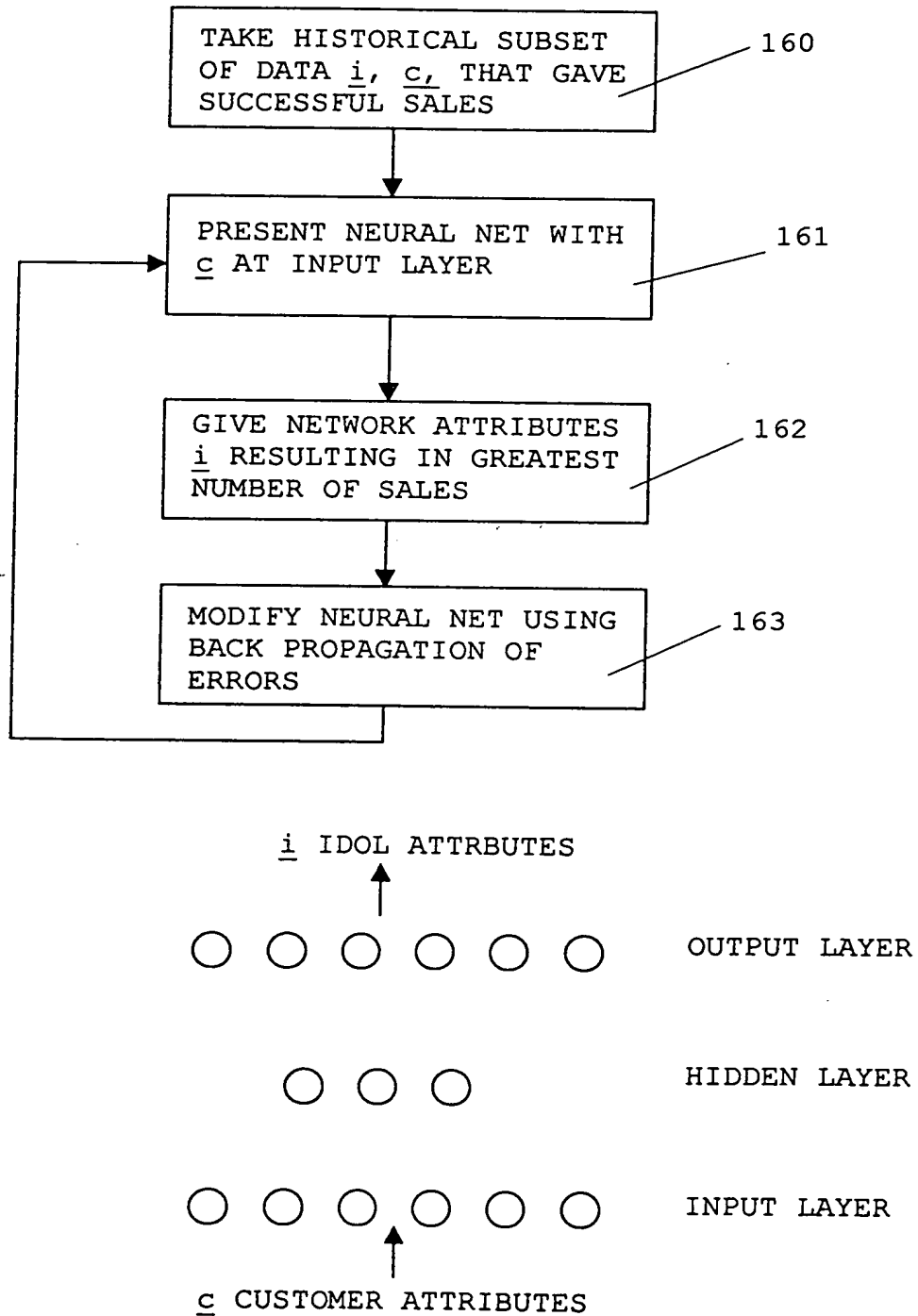


FIGURE 5



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FIGURE 6



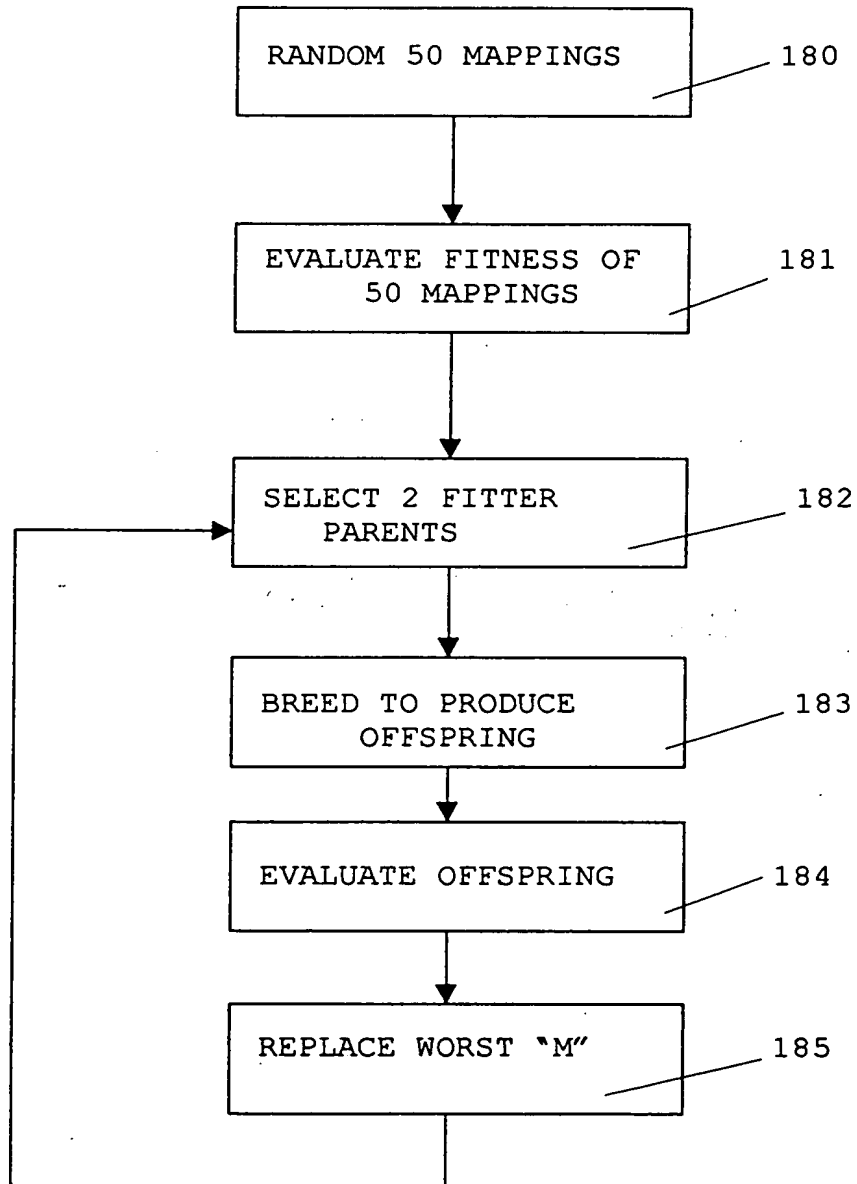
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FIGURE 7

	$i_0$	$i_1$	$i_2$	$i_3$	. . . . .	$i_M$
$C_0$	1	0	1	0	. . . . .	1
$C_1$	0	0	1	0	. . . . .	0
$C_2$	0	1	0	1	. . . . .	0
$C_3$	1	0	0	0	. . . . .	0
.						
.						
.						
$C_N$	1	0	0	0	. . . . .	1

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FIGURE 8



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